Part Number :   FK-FA1418

Product Name :   INFRARED, TEMPERATURE, HUMIDITY SHIELD

This is the experimental board for sensor connectors as the fundamental controlling programming. It can be used with many types of sensor connectors such as Temperature Controller, Moisture Indicator, Infrared Receiver Module, Ultrasonic Module. This circuit is adaptable or is able to upgrade to the other forms of circuits such as Moisture Indicator, Temperature Controller.

Specification

1. Power Supply direct from Microcontroller Board.

2. The circuit can be used with Microcontroller Board such as Arduino UNO R3.

3. The circuit is composed of sensor connectors such as Temperature Controller, Moisture Indicator, Infrared Receiver Module.

4. PCB dimension : 2.15"x1.20"

Circuit function

The circuit is composed of the parts which are used to connect with sensor connectors as follow:

-CON1 is used to connect with Moisture Indicator DHT11, DHT22 or Ultrasonic Module HC-SR04 through the port A2 and A3. To connect CON1 with Moisture Indicator, insert it in the jumpers of JA2 and JA3 but if we want to connect with Ultrasonic Module, remove the jumpers of JA2 and JA3 .

-CON2 is used to connect with Temperature Controller such as 18B20 through the port A0.

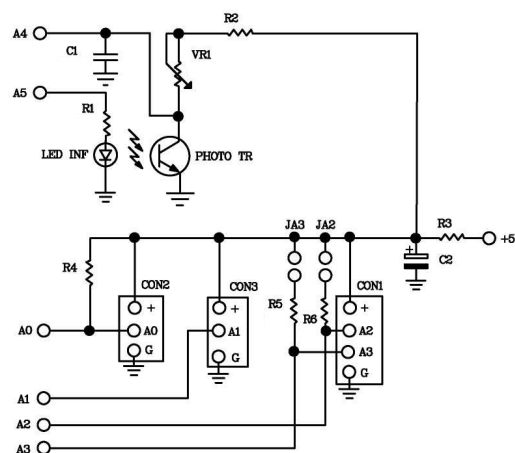-CON3 is used to connect with Infrared Receiver Module through the port A1.

Figure 1. Circuit Diagram of FK1418

Circuit Assembling

According to Figure 2, the easy assembling should be started with putting the smallest part on the circuit which is resistor. Caution, all parts must be on the right electrodes such as LED. Please see Figure 3 for putting parts on electrodes. On the soldering, use a soldering iron max. 40 watts and tin/lead at 60/40 with flux. After assembling and soldering, re-check the positions of each part. In case some parts are on the wrong positions, use solder suction or solder wick to correct the positioning of those parts.
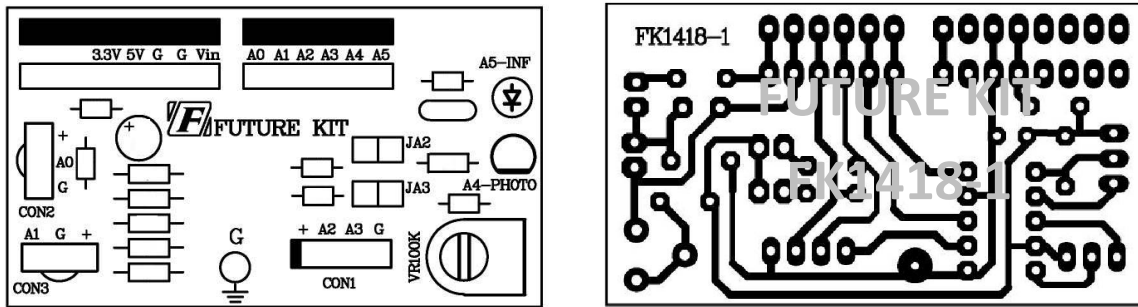

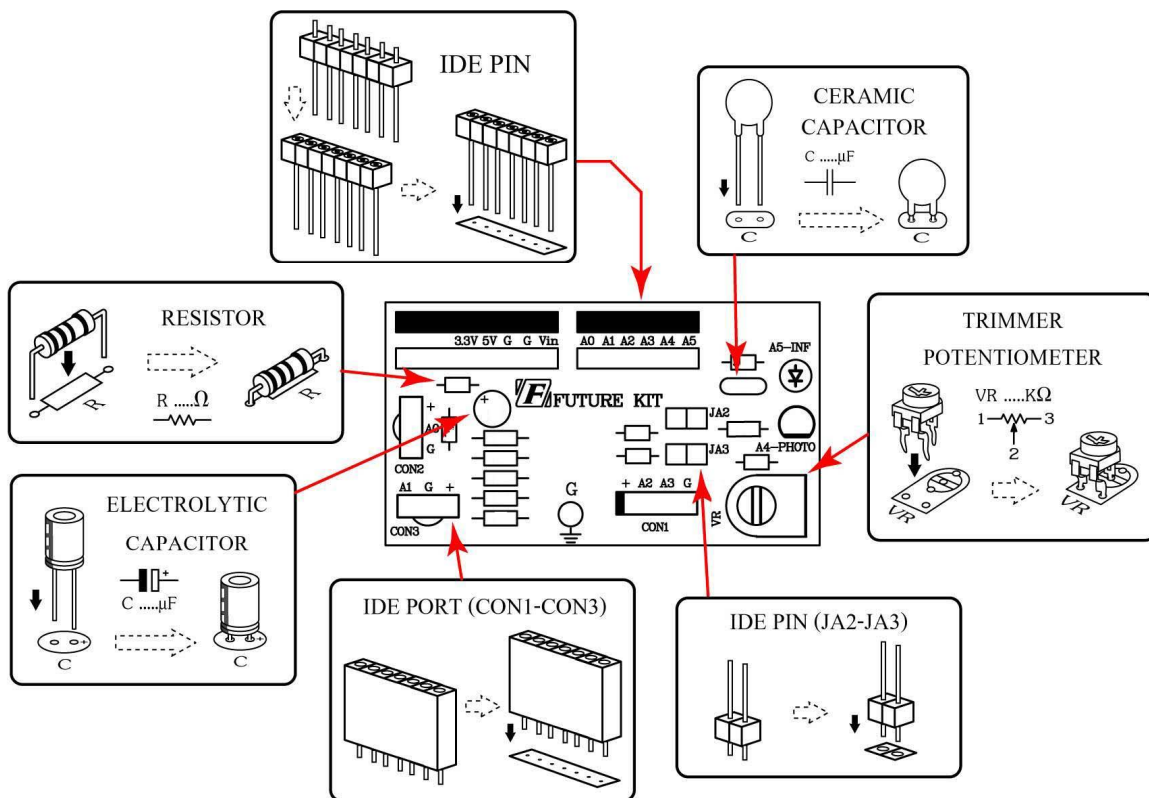Figure 2. The positions for assembling and PCB copper line.

Figure 3. Positioning the parts on PCB

Programming instrument for the experimental board

1.FK-FA1418 INFRARED, TEMPERATURE, HUMIDITY SHIELD   1   set

2.Microcontroller Board ex. Arduino UNO R3   1   set

3.USB Cable   1   Piece

4.Computer Set   1   Set

5.Arduino Software   1   Piece

Testing Arduino UNO R3 Board

1.Connect USB cable with USB port of computer and USB port of Arduino UNO R3 Board.

Figure 4. Connecting USB cable with USB port of Arduino Board

2. Open Arduino program by double-click on Arduino icon. Go to the menu bar, click on File and choose Open. Go to folder "EX" and open folder "TEST". Click on file "Test".
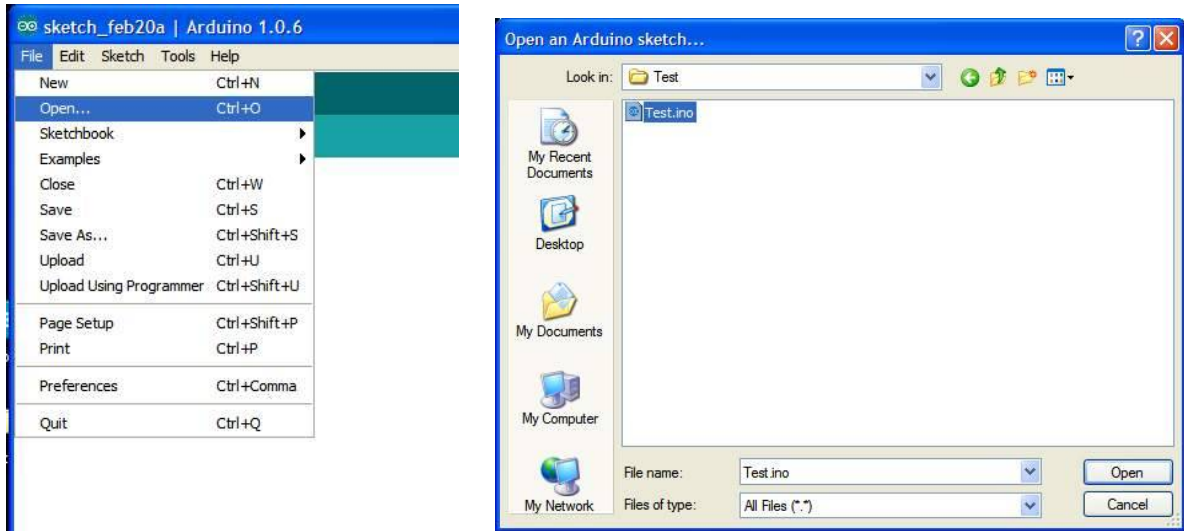

Figure 5. Opening Arduino program

Figure 6. TEST Program

3.Download TEST program to Arduino Board.

Figure 7. Downloading TEST program

4.After downloading, the LED L on Arduino Board will blink which means Arduino board is working.

Figure 8. The position of LED L on Arduino Board circuit

The details of TEST program, Flashing Light Program, Arduino UNO R3 experiment.

```
void setup() {

  pinMode(13, OUTPUT);        // Set the pin 13 is OUTPUT pin.

}
void loop() {

  digitalWrite(13, HIGH);        // LED at the pin 13 is light-on.

  delay(1000);                    // delay time 1 second

  digitalWrite(13, LOW);        // LED at the pin 13 is light-off.

  delay(1000);                    // delay time 1 second

}
```

The method to connect the circuit with Arduino UNO R3 board

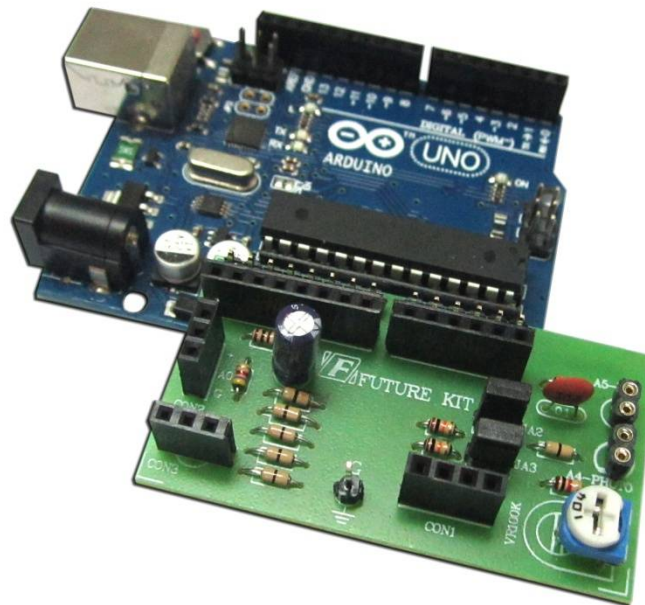Connect FK1418 board with Arduino UNO R3 board by following Figure 9.

Figure 9. Connecting FK1418 board with Arduino UNO R3 board

Programming

1.Connect Arduino UNO R3 board with experimental board by following the instruction of the method to connect the circuit with Arduino UNO R3 board.

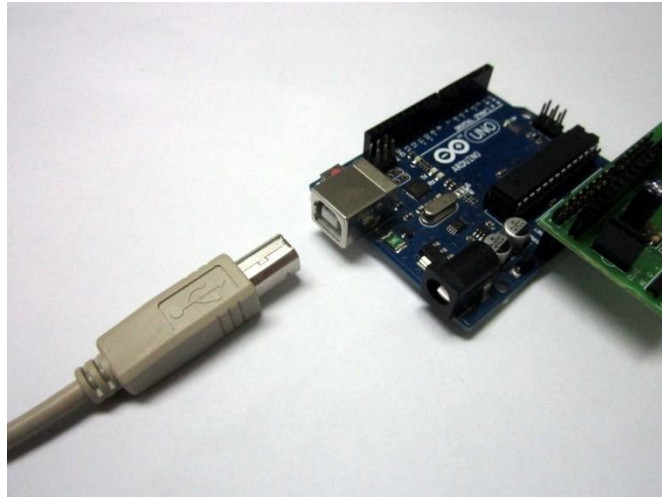2.Connect the USB cable with USB port of computer and USB port of Arduino UNO R3 board.

Figure 10. Wiring the USB cable

3.Double-click on Arduino icon to open Arduino program. Go to "File" in menu bar and choose "Open". Click on folder "Ex", choose folder "FK1418" , choose folder "LAB1418-1" and click on file "LAB1418-1".
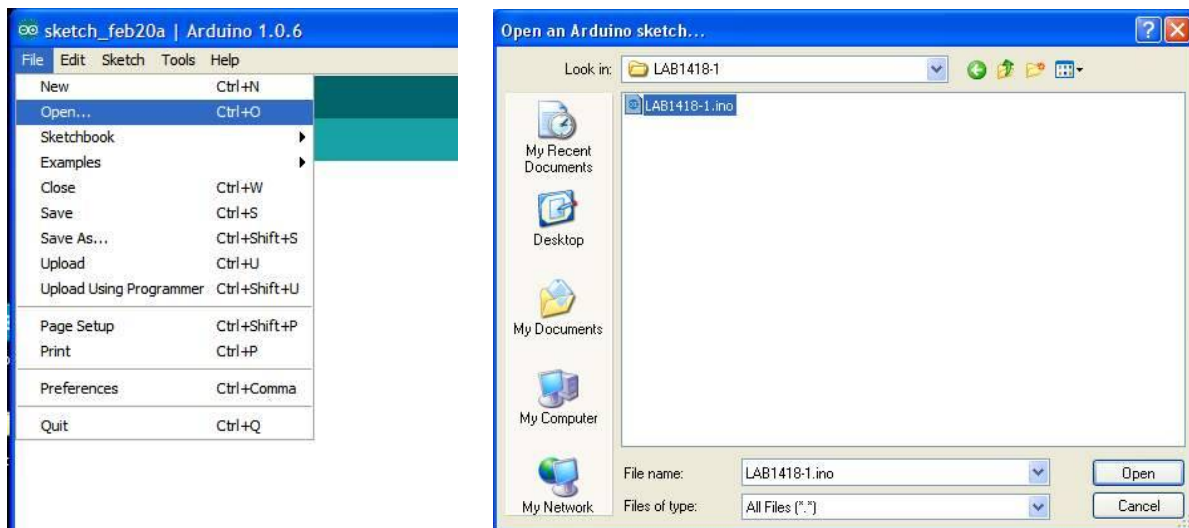

Figure 11. Opening Arduino Program

Figure 12. LAB1418-1 program

4.Download LAB1418-1 program to Arduino board.

Figure 13. Downloading LAB1418-1 program

5.Connect LED TEST with CON3 point. The pin of Resistor must be connected with G point and the pin of LED TEST must be connected with A1. LED TEST will blink. Open LAB1418-2 program in folder "EX". Download LAB1418-2 program to Arduino board, LED TEST will blink. Remove LED TEST and connect it with CON2 point, do it in the same way as connecting with CON3 point but change the pin's position from A1 to A0. LED TEST will blink. Remove LED TEST and connect it with CON1 point and put the pin that's no connection with Resistor in A2, then A3. If LED blinks, it means the connector point is working.
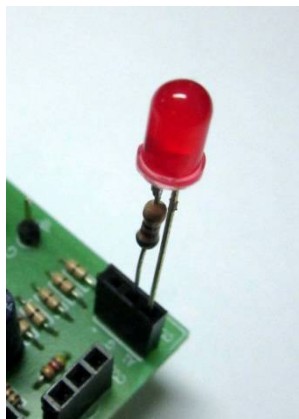

Figure 14. Inserting the LED TEST to the FK1418 board

6. Insert Infrared LED at INF point and Photo Transistor at PHOTO point (please see Figure 15). Connect LED TEST with CON3 point. The pin of resistor must be connected with G point and the pin of LED TEST must be connected with A1. Open LAB1418-2 in folder "FK1418". Download LAB1418-2 program to Arduino board. Adjust the value of resistor until LED TEST is light-off. Hide the front side of Infrared Receiver Module with white paper. The gap between the Infrared Receiver Module and the paper is 1 inch approximately. To test the Infrared circuit if it is working, when hiding it with white paper, LED TEST must be light-on but if removing the white paper, LED TEST is light-off.
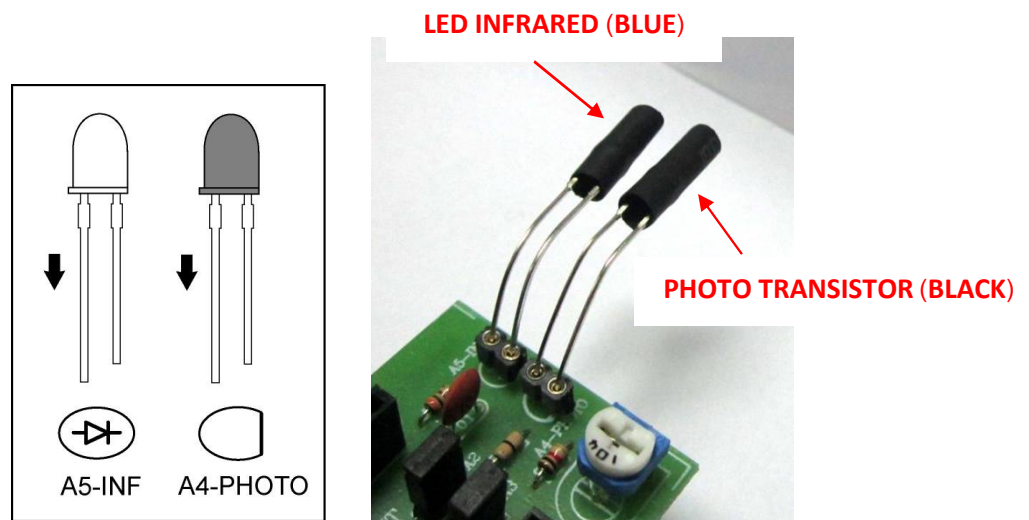
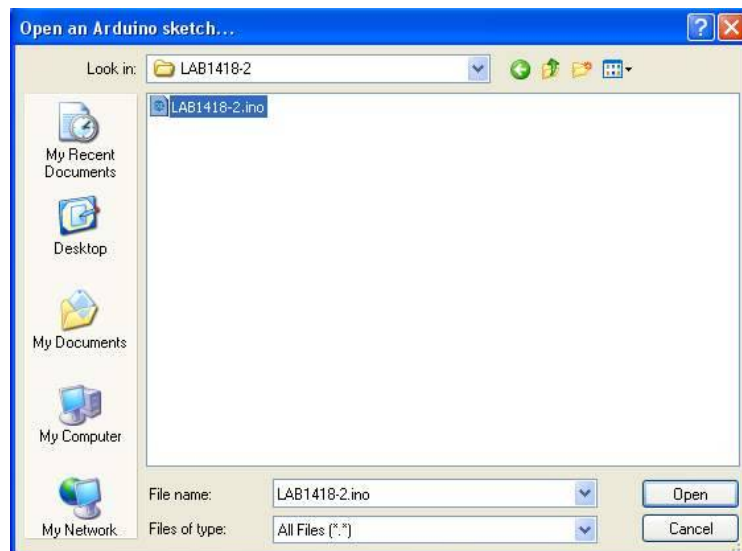Figure 15. Insert Infrared LED and Photo Transistor

Figure 16. LAB1418-2 program

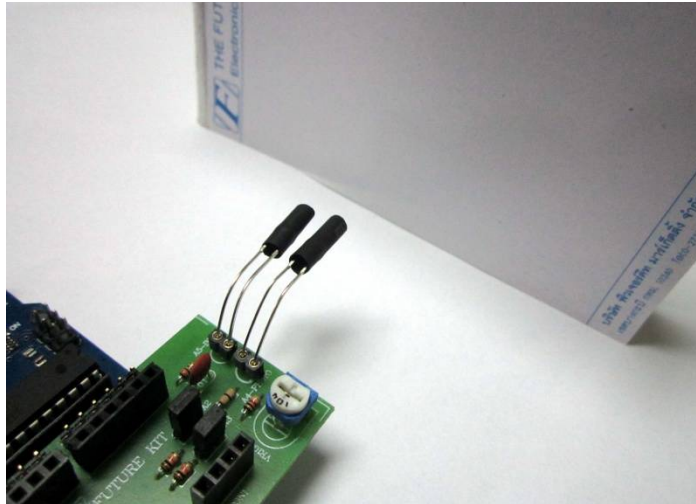Figure 17. Downloading LAB1418-2 program

Figure 18. Distance between TX-RX infrared and paper

The details of LAB1418-1 CON1-CON3 CONNECTOR TEST program

```
void setup() {
  pinMode(A0, OUTPUT);              // Set the pin A0 is OUTPUT pin.
  pinMode(A1, OUTPUT);              // Set the pin A1 is OUTPUT pin.
  pinMode(A2, OUTPUT);              // Set the pin A2 is OUTPUT pin.
  pinMode(A3, OUTPUT);              // Set the pin A3 is OUTPUT pin.
}
void loop() {
  digitalWrite(A0, HIGH);           // LED at the pin A0 is light-on.
  digitalWrite(A1, HIGH);           // LED at the pin A1 is light-on.
  digitalWrite(A2, HIGH);           // LED at the pin A2 is light-on.
  digitalWrite(A3, HIGH);           // LED at the pin A3 is light-on.
  delay(1000);                      // delay time 1 second

  digitalWrite(A0, LOW);            // LED at the pin A0 is light-off.
  digitalWrite(A1, LOW);            // LED at the pin A1 is light-off.
  digitalWrite(A2, LOW);            // LED at the pin A2 is light-off.
  digitalWrite(A3, LOW);            // LED at the pin A3 is light-off.
  delay(1000);                      // delay time 1 second
```

}

Function of LAB1418-1 program

The program will set the pin A0 to pin A3 as OUTPUT pin. It will light up the LED at pin A0 to pin A3 at 1 second and will extinguished at 1 second, the program will start repeating the all LED.

Remark: In case we want LED ON/OFF to blink frequently, reduce the value in the parentheses by commanding "delay". The unit of the digit is millisecond.

The details of LAB1418-2 TX-RX INFRARED TEST program

```
void setup() {

  pinMode(A0, OUTPUT);        // Set the pin A0 is OUTPUT pin.

  pinMode(A4, INPUT);         // Set the pin A4 is INPUT pin.

}

void loop() {

  int PHOTO = digitalRead(A4);        // Set "PHOTO" word is the variable of value at pin A4.

  if (PHOTO == LOW) { digitalWrite(A0, HIGH); } else { digitalWrite(A0, LOW); }
```

// If there is the light into the PHOTO TRANSISTOR (LOW status), LED at pin A0 will be light-on. But if there is no the light into the PHOTO TRANSISTOR (HIGH status), LED at pin A0 will be light-off.

```
}
```

Function of LAB1418-2 program

The program will set the pin A0 as OUTPUT pin and pin A4 as INPUT pin. Besides INPUT pin, pin A4 can be used for activating the function PULL UP as well.

Setting "PHOTO" word is the variable of value at pin A0. If there is the light into the PHOTO TRANSISTOR, LED TEST at pin A4 will light up, but if there is no the light into the PHOTO TRANSISTOR, LED TEST at pin A4 will light-off.